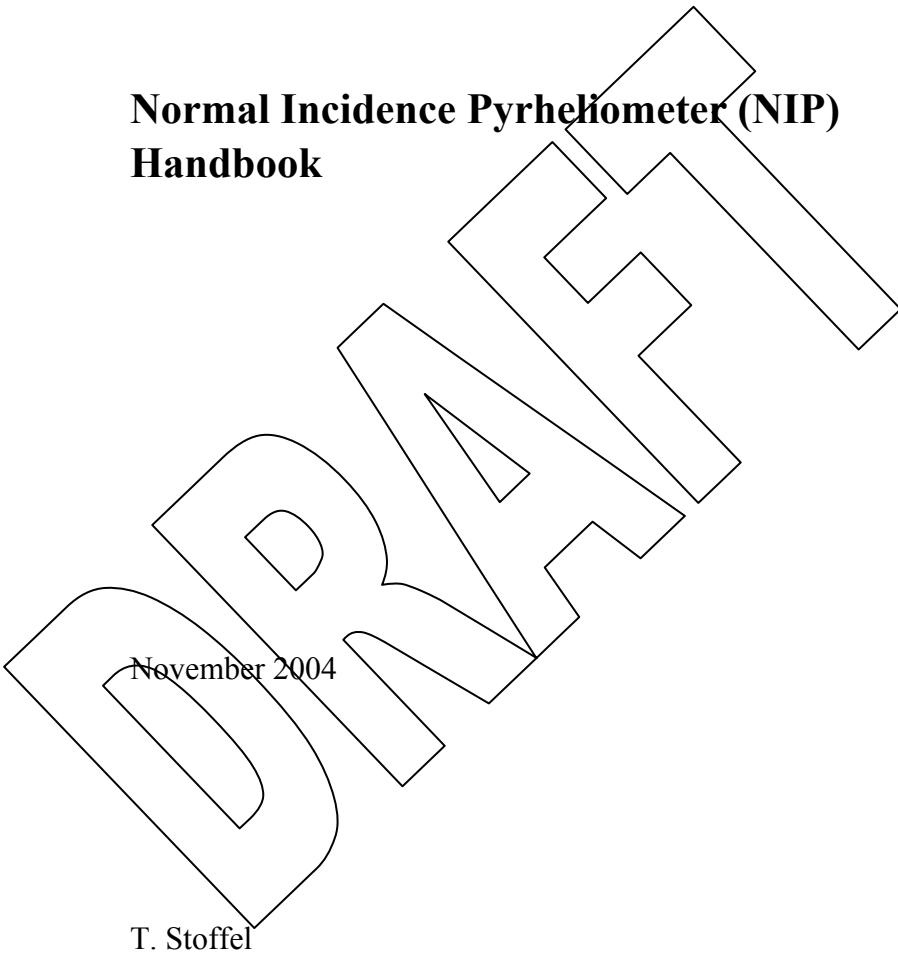


**Normal Incidence Pyrheliometer (NIP)  
Handbook**



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T. Stoffel

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## **1. General Overview**

The NIP is like a narrow view telescope. It has a sensor at the viewing end that measures the amount of solar radiation that falls on it. (Note: For additional information on the pyrheliometer, see the [SIRS page](#).)

## **2. Contacts**

### **2.1 Mentor**

This section is not applicable to this instrument.

### **2.2 Instrument Developer**

This section is not applicable to this instrument.

## **3. Deployment Locations and History**

This section is not applicable to this instrument.

## **4. Near-Real-Time Data Plots**

This section is not applicable to this instrument.

## **5. Data Description and Examples**

### **5.1 Data File Contents**

#### **5.1.1 Primary Variables and Expected Uncertainty**

The primary quantity measured by the NIP is as follows:

DOWNWELLING SHORTWAVE (0.3 to 3.0 micrometers)

1. Direct Normal (beam) irradiance measured by a pyrheliometer with a 5.7 degree field of view.

##### **5.1.1.1 Definition of Uncertainty**

Estimating radiometer measurement uncertainties continues to be a topic for additional research. Based on experiences with these and similar instruments for renewable energy applications, the following estimated measurement uncertainties conservatively apply to NIP measurements.

**Table 1.**

Measurement	Abbreviation	Radiometer Model	Typical Responsivity (?V/Wm <sup>-2</sup> )	Estimated Measurement Uncertainty*
Direct Normal (beam)	DNI	NIP	8.0	?3.0% or 4 Wm <sup>-2</sup>

### 5.1.2 Secondary/Underlying Variables

This section is not applicable to this instrument.

### 5.1.3 Diagnostic Variables

This section is not applicable to this instrument.

### 5.1.4 Data Quality Flags

See [SIRS Data Object Design Changes](#) for ARM netCDF file header descriptions.

### 5.1.5 Dimension Variables

This section is not applicable to this instrument.

## 5.2 Annotated Examples

This section is not applicable to this instrument.

## 5.3 User Notes and Known Problems

This section is not applicable to this instrument.

## 5.4 Frequently Asked Questions

This section is not applicable to this instrument.

## 6. Data Quality

### 6.1 Data Quality Health and Status

The following links go to current data quality health and status results.

- [DQ HandS](#) (Data Quality Health and Status)
- [NCVweb](#) for interactive data plotting using.

The tables and graphs shown contain the techniques used by ARM's data quality analysts, instrument mentors, and site scientists to monitor and diagnose data quality.

## **6.2 Data Reviews by Instrument Mentor**

This section is not applicable to this instrument.

## **6.3 Data Assessments by Site Scientist/Data Quality Office**

All DQ Office and most Site Scientist techniques for checking have been incorporated within [DQ HandS](#) and can be viewed there.

## **6.4 Value-Added Procedures and Quality Measurement Experiments**

Many of the scientific needs of the ARM Program are met through the analysis and processing of existing data products into "value-added" products or VAPs. Despite extensive instrumentation deployed at the ARM CART sites, there will always be quantities of interest that are either impractical or impossible to measure directly or routinely. Physical models using ARM instrument data as inputs are implemented as VAPs and can help fill some of the unmet measurement needs of the program. Conversely, ARM produces some VAPs not in order to fill unmet measurement needs, but instead to improve the quality of existing measurements. In addition, when more than one measurement is available, ARM also produces "best estimate" VAPs. A special class of VAP called a Quality Measurement Experiment (QME) does not output geophysical parameters of scientific interest. Rather, a QME adds value to the input datastreams by providing for continuous assessment of the quality of the input data based on internal consistency checks, comparisons between independent similar measurements, or comparisons between measurement with modeled results, and so forth. For more information, see the [VAPs and QMEs web page](#).

## **7. Instrument Details**

### **7.1 Detailed Description**

#### **7.1.1 List of Components**

This section is not applicable to this instrument.

#### **7.1.2 System Configuration and Measurement Methods**

The NIP is mounted on the solar tracker so that it is always pointing directly at the sun. The value that it measures is called the "direct" solar irradiance.

#### **7.1.3 Specifications**

This section is not applicable to this instrument.

## **7.2 Theory of Operation**

This section is not applicable to this instrument.

## **7.3 Calibration**

### **7.3.1 Theory**

On a clear day at noon at Momote it will have a value of about 1000 watts per square meter. This value will decrease when the sun is lower in the sky. When thick clouds are present (that is, when the solar disk cannot be seen), the NIP should measure approximately zero.

### **7.3.2 Procedures**

This section is not applicable to this instrument.

### **7.3.3 History**

This section is not applicable to this instrument.

## **7.4 Operation and Maintenance**

### **7.4.1 User Manual**

This section is not applicable to this instrument.

### **7.4.2 Routine and Corrective Maintenance Documentation**

This section is not applicable to this instrument.

### **7.4.3 Software Documentation**

ARM netCDF file header descriptions may be found at [SIRS Data Object Design Changes](#).

### **7.4.4 Additional Documentation**

This section is not applicable to this instrument.

## **7.5 Glossary**

See the [ARM Glossary](#).

## **7.6 Acronyms**

See the [ARM Acronyms and Abbreviations](#).

## **7.7 Citable References**

This section is not applicable to this instrument.